

Evaluation of Position Description

Labor Category/FLSA: Nonexempt

 Current Position Description
 X Proposed Position Description

Date Prepared: 06/25/03

Approving Official: Name: Carolyn C. London Signature: Carolyn C. London
Title: HR Specialist

Position Title/Series/Grade: Electronic Industrial Controls Mechanic, WG-2606-11

ORGANIZATION: Division of Property Management, NIEHS

SEE THE EVALUATION THAT WAS ATTACHED TO THE PD.

Installation: National Institute of Environmental Health Sciences, National Institutes of Health, Research Triangle Park, NC
Title: Electronic Industrial Controls Mechanic
Occ Series: 2606
Pay Plan: WG
Grade: 11

Introductory Statement: The Division of Property Management (DPM) serves all of the NIH Community by providing support for renovations, new construction and maintenance of existing facilities, utilities and grounds. The Division provides professional leadership for the engineering programs of the National Institutes of Health (NIH). The scope of DPM operations is such that the effectiveness with which they are carried out has a major and direct effect on the worldwide biomedical research programs of the NIH. In addition to the main facilities at the Bethesda Campus and in Poolesville, MD, NIH has facilities at Research Triangle Park, North Carolina, Rocky Mountain Laboratory in Montana and the Gerontology Research Center in Baltimore, MD. This position is organizationally and physically located within the DPM organizational subcomponent responsible for the provision of real property management services for the NIEHS facilities in Research Triangle Park, NC.

Electronic Industrial Controls Mechanic
WG-2606-11

I. INTRODUCTION

The Facilities Engineering Branch (FEB) plans, directs, supervises, and coordinates all facilities engineering activities that include, but are not limited to, budget formulation; engineering design; facilities inspection, construction and master planning; operation of utility plants and related systems; maintenance and repair of all real property (buildings, grounds, surfaced areas, utility plants and systems); fire prevention and protection; custodial and security service; refuse collection and disposal; design, fabrication, alteration and repair of scientific instrumentation; and storage and supply of construction and maintenance materials.

II. DUTIES

AUTOMATED CONTROLS

25%

Develop, test and implement methods for evaluating, analyzing and correcting facilities control systems malfunctions to return the system to automatic operation and energy efficiency. When requested, provide technical advice and assistance to various commercial contractors and inspect small, contractor installed projects, for fire systems, air handlers. Analyze system failures to determine cause (hardware field devices, system communications) and make appropriate repairs. During analytical and investigatory activities calculate and evaluate BTUs, flows (quantity, velocities and pressures for fluid or gas) for HVAC and other mechanical systems. Anticipate the need for changes to current systems, recommend changes and when approved, adapt new technologies to current systems. Set up animal rooms for special requirements - airflow, air temperature, humidity and lights. Integrate various building control technologies (pneumatic, electronic, etc.), including modifying control strategies logic. Analyze and repair automated building management systems, including HVAC and Fire & Security modules. Instruct building operator on control system use, especially when changes have been made to the computer controls. Perform harmonics distortion analysis of disturbances in electronic systems. Perform PM on chilled and hot water system controls for HVAC & associated equipment (integrated electronic, electrical, and pneumatic control systems). When requested, collect field data for various engineering design requirements (e.g. airflow; equipment size, type and temperature). Update computer system for start and stop of pumps and fans.

SECURITY/FIRE SYSTEM

15%

Analyze, repair, maintain, modify, and/or replace fire and security system, components, including but not limited to: MDH magnetic door holders, temperature switches, hardware hangers, water flow switches, smoke detectors, smoke controls for air handlers, fire alarm audible circuits, visual fire lights, fire pull stations, card readers, door switches, hinges and BACs. Balance SM/4 circuits (speakers).

HVAC/PNEUMATICS**20%**

Analyze, repair, calibrate, maintain, modify, and/or replace system components, to include but not limited to: T-Stats, temperature control panels, damper activators (water, air systems, smoke dampers) control valves, thermostat and tubing to mixing boxes, pneumatic controller, receiver controllers, CVR's and QAC's. Investigate and resolve noise problems associated with distribution of air through HVAC systems.

ELECTRONICS**20%**

Analyze, repair, calibrate, maintain, modify, and/or replace electronic building management system components to include but not limited to: VFD's, analog trunks, building management LANs, EPT co-ax trunks, high voltage DC electronics, analog/digital conversion packages, loop remotes, power supplies, electronic sensors, analog transmitters, variable frequency drives, electronic to pressure transducers and transmitters, programmable logic controllers, and building management electronic equipment.

BUILDING MANAGEMENT COMPUTERS**15%**

Build graphic displays and/or backup databases. Execute screen transfers between F&S and HVAC. Add control/monitor points to computer. Analyze and repair computer peripherals and communication links. Reconfigure control systems/sequences under emergency situations. Customize computer programs to accommodate changes in system operations. Using software programs calculate slopes and curves for performance of utility systems. Reconfigure subsystems and wiring for integration into building management systems. Make changes to chilled water system loop controls. ID system computer components that need to be trended (see how controls working).

ADMINISTRATIVE**5%**

Maintain parts inventory; make recommendations for revisions to PM requirements; order parts; attend meetings; and prepare specialized reports. Employee drives Government vehicles to various portions of the NIEHS campus to transport personnel, tools, equipment, and building supplies to required location, in order to perform work.

III. SKILLS and KNOWLEDGE

The incumbent must have the ability to repair, overhaul and calibrate/adjust extremely complex and unique equipment which performs data translation, interpretation and conversion functions such as: digital transmission/communication equipment, electronic interface components, high speed printers, cathode ray terminals, transducers, converters, invertors, central and remote processors, magnetic core, disk and tape data storage systems. The incumbent must have a comprehensive trade knowledge of the operating electrical and electronic principles related to the equipment under his responsibility and be familiar with the functional relationships and impact of repairs or modifications on all of the related devices of the equipment services. The incumbent must have the ability to read and interpret complex drawings, wiring diagrams and technical specifications in order to identify and remedy malfunctions in such devices as: computer electronic subsystem, with fixed-head disks and drives, printed circuit boards, power supplies, central processors and loop remote devices operating at 50 HVAC and 27 fire and security frames rates,

respectively, remote sensing devices, converters, interpreters, as well as perform field wiring.

Position requires valid state driver's license and the ability to qualify for a government driver's license.

Problems in computerized systems are frequently "layered or tiered", i.e., several simultaneous faults mask or otherwise obscure one another and require perseverance and imagination to get to the source of the problem. The incumbent must have demonstrated troubleshooting abilities.

The incumbent must be capable of utilizing tools or test devices such as: Signal/frame generators, analog/digital converters, digital volt/ohm/amp meters, decade boxes, for special applications such as: diagnosing communication faults, calibration of field devices, P.C. component alignment, troubleshooting system failure down to component level. The incumbent uses complex mathematical formulas to convert from decimal number systems to Binary and Hexadecimal number systems, verifies computer calculated values for: refrigeration tonnage, electrical power factor, BTU's Energy Consumption data such as: BTU/CCF, BTU/Ton, BTU/Gal., R.Tons/Day, KW demand limiting (knowledge of differential equations).

The incumbent applies visual-motor skills to make precise adjustments on delicate components such as: optical card readers, high speed (4800) and (1200) baud printers, integrated circuit components, bridge circuits, analog/digital converters, modulators/demodulator, P.C. Boards, install and test new or moved components.

IV. SUPERVISION and GUIDANCE RECEIVED

The incumbent reports to the Supervisor of the building system group. The incumbent receives work assignments from the supervisor in the form of work orders and oral discussions and works in accordance with available manuals, drawings and specifications. The incumbent is responsible for making independent judgements and decisions regarding the methods and procedures for completing assignments and must know the impact repairs, changes and adjustments will have on related instrumentation as well as the entire systems. The incumbent is responsible for keeping abreast of technological changes and for providing guidance and assistance to other workers. The supervisor is available to provide advice on unusually difficult problems and completed work is subject to spot check for compliance with accepted trade practices. Incumbent is responsible for monitoring and maintaining adequate stock levels of commonly used materials and supplies and anticipates needs for recurring requirements. Incumbent accomplishes the above by periodically checking stock levels and initiating a request for purchases in a timely manner. Incumbent maintains records such as work orders and maintenance orders and prepares reports reflecting such information as attendance, material used, hours worked and work completed. On occasion, the incumbent may be required to work other than normal hours, weekends and holidays as needed.

V. OTHER FACTORS

Physical Effort

Incumbent works in a sitting position for extended periods of time and climbs ladders, crawls, bends, stoops, crouches at interstitial levels and lifts up to 40 pounds. Incumbent is subject to prolonged standing, walking on concrete floors, climbing stairways and ladders and must exert light to moderate effort in making repairs.

VI. WORKING CONDITIONS

Normally, work is performed inside heated buildings or interstitial spaces but incumbent may frequently go outside during inclement weather. Incumbent is exposed to the hazards of working around running machinery, including exposure to extreme noise, boiler safety valve burst, steam leaks, soot, scalding water, hot oil, burns from hot surfaces and toxic amounts of gas, fumes and odors. Work environment includes noise, extremes of heat and cold and frequently poor lighting and ventilation

Evaluation Statement

Location: Office of Management, Facilities Engineering Branch, NIEHS, Research Triangle Park, NC

Incumbents & Classification: ~~David Little, Instrument Mechanic, WG-3359-11; Robert Roe, Instrument Mechanic, WG-3359-11; Jerry Beasley, Instrument Mechanic, WG-3359-11.~~ *Delete 2/15/00*

Nature of Action: Revised position description. Employees requested position review.

References:

- OPM Job Grading Standard for Electronic Equipment Installation and Maintenance Family, WG-2600, dated August 1981
- OPM Job Grading Standard for Electronic Industrial Controls Mechanic, WG-2606, dated April 1987
- OPM Job Grading Standard for Instrument Mechanic, WG-3659, dated March 1995
- OPM Job Grading Standard for Electronic Integrated Systems Mechanic, WG-2610, dated July 1981
- OPM Position Classification Standard for Engineering Technician, GS-802, dated August 1974
- "Guidelines for the Determination of Trades, Crafts, or Manual-labor Positions" (Section IV of the Introductory Material to the Position Classification Standards)

Pay System (WG or GS) Determination:

The "Guidelines for the Determination of Trades, Crafts, or Manual-Labor Positions" in Section IV of the Introductory Material to Position Classification Standards reference the Classification Act as exempting from Act (and, therefore, General Schedule) coverage "employees in recognized trades or crafts, or other skilled mechanical crafts . . . and other employees . . . in positions having trade, craft, or laboring experience and knowledge as the paramount requirement." Section IV defines the "paramount requirement" as "the most important, or chief, requirement for the performance of the primary duty or responsibility for which the position exists."

"Mixed positions" that have duties requiring trades and craft occupational knowledge and experience as well as other duties are also exempt from Act coverage if they have as "the paramount requirement for the performance of [their] primary duty, knowledge and experience in the trades, crafts, or manual-labor occupation."

The primary duties of subject positions are to operate, maintain, and repair building utility and environmental control systems, including HVAC and fire and security systems. The **paramount** knowledge required to perform these duties is knowledge of the practical application of electronics theories and circuits applicable to power, timing, motion control, indicating devices, and pulse and counting mechanisms, including special purpose digital computers dedicated to control functions. Incumbents must also have knowledge of utility system equipment operation and processes.

Although these positions are "mixed" in that they perform some duties characteristic of General Schedule technicians, such as helping test and evaluate new or modified electronic systems and modifying equipment to site characteristics, these duties are limited and are not performed as an inherent part of engineering functions assigned to them. Rather, incumbents use "... electronic theory, mathematics, and experience ... to follow and understand the design concepts of others, to understand the purpose and operation of parts and circuits, to follow signal flow through assemblies and components and recognize proper wave forms and signal values to tune equipment for optimum performance and to locate and correct malfunctions." (Reference: OPM Job Grading Standard (JGS) for the Electronic Equipment Installation and Maintenance Family, WG-2600.)

Typical functions performed by these positions are characteristic of "mechanic" rather than "technician" positions in the Federal Government, in accordance with the OPM JGS for the Electronic Equipment Installation and Maintenance Family, WG-2600. Incumbents repair building control systems by detecting and diagnosing malfunctions; repairing and replacing parts and components; and aligning, calibrating, and testing modified and repaired equipment. They perform preventive and corrective maintenance by periodically servicing equipment; inspecting and testing equipment for compliance with specified standards of performance; calibrating and aligning systems; and diagnosing and correcting malfunctioning systems. They perform installation functions such as reinstalling repaired and modified equipment; arranging and interconnecting equipment; testing installations for compliance with standards and tolerances; and calibrating and tuning systems. These duties are consistent with management's purpose for establishing the position, i.e., the operation, maintenance and repair of building control systems, and are determined to be Wage Grade rather than General Schedule.

Series Determination:

Incumbents are currently classified as Instrument Mechanics, WG-3359-11. This occupational series covers work involved in installing, aligning, modifying,

troubleshooting, repairing, overhauling, testing, and calibrating a variety of instruments containing electric, mechanical, pneumatic, hydraulic, and/or electronic components, assemblies, and controls. The work includes using manual and automated test equipment such as pneumatic, hydraulic, or vacuum test stands or computer controlled electronic test consoles to test, align, and calibrate instruments. In addition, the work includes maintaining, repairing, and calibrating precision instruments and standards such as dial indicators, concentricity gauges, sine bars, micrometers, and plug and ring gauges. This work requires knowledge and application of electrical and mechanical principles; knowledge of pneumatic and/or hydraulic mechanisms; and, in some work situations, knowledge of electronic principles and theory. At the WG-11 level, Instrument Mechanics maintain, repair, and calibrate such items as gyro magnetic compass systems and displacement gyro platform systems in aircraft inertial navigation units, or mechanical, pneumatic, hydraulic, and electrical/electronic precision measurement test consoles.

The WG-3359 series specifically excludes work that primarily involves installing, maintaining, troubleshooting, repairing, and calibrating electronic controls and indicating and recording systems used . . . in energy monitoring and control utility systems. Since such duties constitute a significant percentage of incumbent positions, the WG-3359 series does not adequately capture the true nature of these positions.

The Electronic Integrated Systems Mechanic, WG-2610, occupational series covers nonsupervisory jobs involved in rebuilding, overhauling, installing, troubleshooting, repairing, modifying, calibrating, aligning, and maintaining integrated electronic systems. Integrated systems are defined in the standard as systems composed of a number of subsystems in which, in order to accomplish the desired objective, the output of the sensor subsystems is integrated in a logic subsystem and the resultant used to modify the operation of the sensor subsystems and actuator subsystems in response to internal and external changing conditions. As defined in the standard, electronic integrated systems have a very large number of circuits and functions and are composed of a number of complete simple subsystems such as radar, computers, missile launchers, or others that are closely interconnected to accomplish design objectives.

Examples of integrated systems provided in the Job Grading Standard for the WG-2610 series include the following: fire control, flight/landing control, automatic test equipment, flight simulators, bombing-navigation, and electronic warfare or multiple integrated electronic systems composed of several of these systems that are closely interrelated and interdependent. The WG-2610 standard specifically excludes work that primarily involves maintaining and repairing electronic controls and indicating devices used on industrial machinery, indicating that such work is covered by the Electronic Industrial Controls Mechanic Series, WG-2606.

The utility, fire, and security systems in the NIEHS facility are predominantly stand alone systems, and although it can be said that some elements in the building control

Duties:

Incumbents analyze and repair the following automated building management systems, which have integrated electronic, electrical, and pneumatic controls, and perform preventive and corrective maintenance on them. They analyze system failures and respond to a variety of calls related to improper system functioning.

- Landis & Gyr computer control system for site primary HTHW & CHW loops (Bldg 105 with sensors in Modules B & F) and secondary CHW loop in Bldg 101 (Modules A-E)
- JCI Metasys, a distributed control system, with numerous panels (pneumatic/electrical/electronic controllers); the secondary HTHW & CHW control system for Module F/MRI
- Sixnet, the secondary HTHW control system for Bldg 101 (Module B)
- ProtoStar/Mod Comp, a mainframe building control/management system
- Simplex fire alarm system

Typical assignments include the following: responding to complaints related to the HVAC system (e.g., high and low temperature readings in work areas and animal room, noisy ventilation, and air flow problems); responding to various system alarms (e.g., fume hoods and fire system speakers); repairing card readers; adding computer monitor points; calibrating controllers; and troubleshooting and repairing electronic doors.

(1) Skill and Knowledge

Skill and knowledge are comparable to the referenced standard's descriptive requirements at the WG-11 level. Incumbents use greater scope and depth of knowledge than required at the WG-10 level due to the complexity of systems to be repaired. They interpret engineering drawings that combine electrical and electronic schematics, logic diagrams, and mechanical drawings to trace signal flow throughout the system while troubleshooting complex systems. They must know the characteristic voltage, current, and signal shape of the input and output of a wide variety of microprocessors and circuits to recognize indications of improper operation and differentiate them from temporary anomalies introduced by the testing itself. They must be skilled in the interpretation of installation and repair instructions that frequently describe only general applications for the various components rather than their interface with other components of the specific system, since the various components are often produced by manufacturers with different design philosophies such as when controls are connected through customized interface devices to electrical, mechanical,

pneumatic, or hydraulic controls of components that vary greatly in operating theories and operating tolerances as a result of differing age, purpose, and manufacturers' practices. To troubleshoot controls, mechanics use Boolean algebra to construct truth tables and logic equations for analysis of logic circuits and program simple test instructions on an input console to check out circuits or functions.

Knowledge required does not fully meet the GS-12 level benchmark because incumbents are not required to troubleshoot complex electronic systems characterized by unusual circuit arrangements and theories and lack of developed documentation. WG-12 Mechanics work on new systems of great complexity, generally serving as "lead workers" on teams installing and putting into operation major electronic control systems that are new to the activity or that are major modifications of existing systems, so that there is little knowledge of the system problem areas or expertise in its repair. They troubleshoot and repair new systems during operational tests and improvise procedures to cope with unforeseen defects. They construct interface devices and modifications to the equipment from sketches and verbal instructions to refine new system operations. Assignments are characterized by application of advanced electronic theory and frequent technological changes in systems.

(2) Responsibility

Job responsibilities are comparable to the referenced standard's requirements at the WG-11 level because they receive oral instructions, calls from individuals with problems, or written work orders. Assignments require more judgments and decisions than at the WG-10 level regarding the methods and procedures for completing assignments, which may involve extending the use of conventional tools and equipment and improvising changes to techniques and procedures to reach specified parameters when aging components or modification of circuits have changed operating conditions. The mechanics are responsible for knowing and judging the impact of repairs, i.e., the effects that changes and adjustments will have on the related integral devices of the equipment.

Mechanics plan the work sequence and determine that equipment meets the needs for serviceability. They are also responsible for applying sound judgment in decisions that contribute toward greater operating life and efficient operations. They must keep abreast of technological changes in the occupation.

Technical advice is available on unusually difficult problems. Completed work is spot checked for compliance with accepted trade practices and specifications.

Responsibility does not meet the WG-12 benchmark because complex installation and repair are typically resolved by facility engineers or contractors and incumbents do not submit for approval changes to detailed schematics,

drawings, and maintenance procedures for use by lower graded employees. In addition, they do not provide technical guidance and assistance to lower graded employees.

(3) Physical Effort

Physical effort is comparable to the referenced standard's description, which is the same for all grades. Work assignments require moderate physical effort, including lifting items weighing up to 40 pounds. Incumbents work in a sitting position for extended periods and are subject to prolonged standing, walking on concrete floors, and climbing stairs and ladders. They must crawl, bend, stoop, and crouch in interstitial spaces.

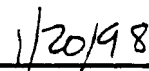
(4) Working Conditions

Working conditions are more difficult than the referenced standard's description, which is the same for all grades. The work environment includes extreme noise, extremes of heat and cold, and, frequently, poor lighting and ventilation. Although work is normally performed inside heated buildings, incumbents must frequently go outside during inclement weather. Incumbents are subject to injuries such as boiler safety valve burst, steam leaks, soot, scalding water, hot oil, burns from hot surfaces, and toxic amounts of gas, fumes, and odors.

Conclusion: These positions are properly classified as Electronic Industrial Controls Mechanics, WG-2606-11



Ayn Clayborne
Personnel Management Specialist



Date